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CLAIMS

What is claimed is:

1. An isolated and purified biologically active STRAP polypeptide capable of modulating TGF- β biological activity.

5 2. The polypeptide of claim 1, wherein the polypeptide comprises a vertebrate STRAP.

3. The polypeptide of claim 1, further comprising the amino acid sequence of SEQ ID NO:2.

4. The polypeptide of claim 1, further comprising:

10 (a) a polypeptide encoded by a nucleic acid sequence as set forth in SEQ ID NO:1;

(b) a polypeptide encoded by a nucleic acid having at least about 75% or greater homology to a nucleic acid sequence as set forth in any of SEQ ID NOs:1, 3 and 5;

15 (c) a polypeptide encoded by a nucleic acid capable of hybridizing under stringent conditions to a nucleic acid comprising a sequence or the complement of a sequence as set forth in SEQ ID NO:1;

20 (d) a polypeptide which is a biologically functional equivalent of a peptide as set forth in SEQ ID NO:2;

(e) a polypeptide which is immunologically cross-reactive with antibodies which are immunologically reactive with peptides encoded by the nucleic acid sequences as set forth in SEQ ID NO:2;

25 (f) a polypeptide encoded by a nucleic acid molecule capable of hybridizing to a nucleic acid molecule having the sequence of SEQ ID NO:1, or fragments or variants or complementary sequences thereof, under high stringency conditions; or

30 (g) a polypeptide comprising a portion of a polypeptide of a), b), c), d), e), or f).

5. The polypeptide of claim 1, modified to be in detectably labeled form.

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6. An isolated and purified antibody capable of specifically binding to the polypeptide of claim 1.

7. The antibody of claim 6 which is a monoclonal antibody.

8. The antibody of claim 6 which is a polyclonal antibody.

5 9. A hybridoma cell line which produces the monoclonal antibody of claim 7.

10. An isolated and purified antibody capable of neutralizing the biological activity of the polypeptide of claim 1.

11. The antibody of claim 10 which is a monoclonal antibody.

10 12. The antibody of claim 10 which is a polyclonal antibody.

13. A hybridoma cell line which produces the monoclonal antibody of claim 11.

15 14. An isolated and purified nucleic acid segment comprising an isolated gene encoding a biologically active STRAP polypeptide capable of modulating TGF- β biological activity.

15. The nucleic acid segment of claim 14, wherein the isolated gene encodes a vertebrate STRAP.

16. The nucleic acid segment of claim 15, wherein the isolated gene encodes a mammalian STRAP.

20 17. The nucleic acid segment of claim 14, wherein the isolated gene encodes STRAP comprising the amino acid sequence of SEQ ID NO:2.

18. The nucleic acid segment of claim 14, further comprising the STRAP-encoding nucleic acid sequence of SEQ ID NO:1.

25 19. The nucleic acid molecule of claim 18, wherein the isolated nucleic acid molecule selected from the group consisting of:

- 30 (a) an isolated nucleic acid molecule which hybridizes to the nucleic acid sequence given herein as SEQ ID NO:1 under wash stringency conditions represented by a wash solution having less than about 200 mM salt concentration and a wash temperature of greater than about 45°C, and which encodes a STRAP; and
- (b) an isolated nucleic acid molecule differing from the isolated nucleic acid molecule of (a) above in nucleic acid sequence due

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to the degeneracy of the genetic code, and which encodes a STRAP encoded by the isolated nucleic acid of (a) above.

20. The nucleic acid segment of claim 14, further defined as a DNA segment.

5 21. The nucleic acid segment of claim 14, wherein the isolated gene is positioned under the control of a promoter.

22. The nucleic acid segment of claim 14, further defined as a recombinant vector which comprises the isolated gene.

10 23. The nucleic acid segment of claim 22, wherein the vector is a recombinant expression vector.

24. The nucleic acid segment of claim 22, further defined as a nucleic acid fragment of up to 10,000 basepairs in length.

15 25. The nucleic acid segment of claim 24, further defined as comprising at least a 1,000 nucleotide long contiguous stretch of the nucleic acid sequence of SEQ ID NO:1.

26. A recombinant host cell comprising the nucleic acid segment of claim 14.

27. The recombinant host cell of claim 26, wherein the host cell is a procaryotic cell.

20 28. The recombinant host cell of claim 26, wherein the host cell is a eukaryotic cell.

29. A method of preparing a STRAP polypeptide, comprising: transforming a cell with the nucleic acid segment of claim 14 to produce STRAP under conditions suitable for the expression of said polypeptide.

25 30. A method of detecting in a sample an RNA that encodes the STRAP polypeptide encoded by the nucleic acid of claim 14, said method comprising the steps of:

(a) contacting said sample under hybridizing conditions with the nucleic acid segment of claim 14 to form a duplex; and

30 (b) detecting the presence of said duplex.

31. A method of producing an antibody immunoreactive with a STRAP polypeptide, the method comprising steps of:

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- 5 (a) transfecting a recombinant host cell with the nucleic acid segment of claim 14, which encodes a STRAP polypeptide;
- (b) culturing the host cell under conditions sufficient for expression of the polypeptide;
- (c) recovering the polypeptide; and
- (d) preparing the antibody to the polypeptide.

32. The method of claim 31, wherein the polypeptide comprises SEQ ID NO:2.

10 33. The method of claim 31, wherein the nucleic acid segment comprises SEQ ID NO:1.

34. An antibody produced by the method of claim 31.

15 35. A method of detecting a STRAP polypeptide, the method comprising immunoreacting the polypeptide with an antibody prepared according to the method of claim 31 to form an antibody-polypeptide conjugate; and detecting the conjugate.

36. A method of detecting a messenger RNA transcript that encodes a STRAP polypeptide, the method comprising the steps of hybridizing the messenger RNA transcript with the nucleic acid segment of claim 14 to form a duplex; and detecting the duplex.

20 37. A method of detecting a DNA molecule that encodes a STRAP polypeptide, the method comprising the steps of hybridizing DNA molecules with the nucleic acid segment of claim 14 to form a duplex; and detecting the duplex.

25 38. An assay kit for detecting the presence of a STRAP polypeptide in a biological sample, the kit comprising a first container containing a first antibody capable of immunoreacting with a STRAP polypeptide of claim 1, wherein the first antibody is present in an amount sufficient to perform at least one assay.

30 39. The assay kit of claim 38, further comprising a second container containing a second antibody that immunoreacts with the first antibody.

40. The assay kit of claim 39, wherein the first antibody and the second antibody comprise monoclonal antibodies.

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41. The assay kit of claim 39, wherein the first antibody is affixed to a solid support.

42. The assay kit of claim 39, wherein the first and second antibodies each comprise an indicator.

5 43. The assay kit of claim 42, wherein the indicator is a radioactive label or an enzyme.

44. An assay kit for detecting the presence, in biological samples, of a STRAP polypeptide, the kit comprising a first container that contains a nucleic acid segment identical or complimentary to a segment of at least ten
10 contiguous nucleotide bases of the nucleic acid segment of claim 14.

45. An assay kit for detecting the presence, in a biological sample, of an antibody immunoreactive with a STRAP polypeptide, the kit comprising a first container containing a STRAP polypeptide of claim 1 that immunoreacts with the antibody, with the polypeptide present in an amount sufficient to
15 perform at least one assay.

46. A method of screening candidate substances for an ability to modulate STRAP biological activity and to thereby modulate TGF- β biological activity, the method comprising the steps of:

- 20 (a) establishing replicate test and control samples that comprise TGF- β and a STRAP polypeptide capable modulating the biological activity of TGF- β ;
- (b) administering a candidate substance to the test sample but not the control sample;
- 25 (c) measuring the biological activity of TGF- β in the test and the control samples; and
- (d) determining that the candidate substance modulates STRAP biological activity and thereby modulates the biological activity of TGF- β if the biological activity of TGF- β measured for the test sample is greater or less than the
30 biological activity of TGF- β level measured for the control sample.

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47. The method of claim 46, wherein the replicate test and control samples further comprise a cell that expresses a vertebrate STRAP polypeptide capable of modulating the biological activity of TGF- β .

48. A recombinant cell line suitable for use in the method of claim 46.

5 49. A method of modulating STRAP polypeptide activity in a vertebrate, the method comprising the step of administering to the vertebrate an effective amount of a substance capable of modulating the STRAP polypeptide activity in the vertebrate, whereby modulation of the STRAP polypeptide activity is accomplished.

10 50. The method of claim 49, wherein the step of administering further comprises administering an effective amount of a substance that modulates expression of a STRAP-encoding nucleic acid segment in the vertebrate.

15 51. The method of claim 50, wherein the substance that modulates expression of a STRAP-encoding nucleic acid segment comprises an antisense oligonucleotide.

52. The method of claim 49, where the substance that modulates the STRAP activity comprises an anti-STRAP antibody.

53. The method of claim 52, where the anti-STRAP antibody comprises a monoclonal activity.

20 54. The method of claim 49, wherein the STRAP activity comprises modulating TGF- β activity, and wherein the step of administering comprises administering to the vertebrate an effective STRAP-modulating amount of a substance capable of modulating STRAP modulation of TGF- β activity.

55. The method of claim 49, wherein the vertebrate is a mammal.

25 56. The method of claim 55, wherein the mammal is a human.

57. A method of treating a subject suffering from a disorder associated with TGF- β activity in the subject, the method comprising the steps of:

30 (a) administering to the subject an effective amount of a substance capable of modulating STRAP activity in the subject, whereby modulation of the STRAP polypeptide activity is accomplished; and

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- (b) modulating the TGF- β activity in the subject through the modulation of the STRAP activity, whereby treatment of the disorder is accomplished.

5 58. The method of claim 57, wherein the step of administering further comprises administering an effective amount of a substance that modulates expression of a STRAP-encoding nucleic acid segment in the patient.

59. The method of claim 58, wherein the substance that modulates expression of a STRAP-encoding nucleic acid segment comprises an antisense oligonucleotide.

10 60. The method of claim 57, wherein the substance capable of modulating STRAP activity in the vertebrate comprises an anti-STRAP antibody.

61. The method of claim 60, wherein the anti-STRAP antibody comprises a monoclonal antibody.

15 62. A method of treating a subject suffering from a disorder associated with TGF- β activity in the subject, the method comprising the step of administering to the subject a therapeutic composition which comprises a biologically active STRAP in amount effective to modulate the biological activity of TGF- β in the subject, whereby treatment of disorder associated with TGF- β
20 activity in the subject is accomplished.

63. The method of claim 62, wherein the therapeutic composition comprises STRAP as essentially set forth in SEQ ID NO:2 and a pharmaceutically acceptable carrier.

25 64. A pharmaceutical composition comprising an isolated and purified biologically active STRAP polypeptide and a pharmaceutically acceptable carrier.

65. The pharmaceutical composition of claim 64, wherein the polypeptide comprises a polypeptide as essentially set forth in SEQ ID NO:2.

30 66. The pharmaceutical composition of claim 64, wherein the polypeptide is encoded by a polynucleic acid sequence as essentially set forth in SEQ ID NO:1.

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67. The pharmaceutical composition of claim 64, further comprising a cell expressing the polypeptide.

5 68. A pharmaceutical composition comprising an isolated and purified polynucleic acid encoding a biologically active STRAP polypeptide and a pharmaceutically acceptable carrier.

69. The pharmaceutical composition of claim 68, wherein the encoded polypeptide comprises an amino acid sequence as essentially set forth in SEQ ID NO:2.

10 70. The pharmaceutical composition of claim 68, further comprising a STRAP-encoding polynucleic acid sequence as essentially set forth in any of SEQ ID NO:1.

71. The pharmaceutical composition of claim 68, wherein the polynucleic acid is a DNA segment.

15 72. The pharmaceutical composition of claim 68, wherein the polynucleic acid is positioned under the control of a promoter.

73. The pharmaceutical composition of claim 68, wherein the polynucleic acid further comprises a recombinant vector.

20 74. The pharmaceutical composition of claim 68, further comprising a cell expressing the encoded polypeptide.

25 75. A transgenic non-human animal having incorporated into its genome a nucleic acid segment comprising an isolated gene encoding a biologically active STRAP polypeptide capable of modulating TGF- β activity, the nucleic acid segment being present in said genome in a copy number effective to confer expression in the animal of the STRAP polypeptide.

76. The transgenic non-human animal of claim 75, wherein said nucleic acid segment is further defined as a mammalian STRAP-encoding segment.

30 77. The transgenic non-human animal of claim 75, wherein the expression of the STRAP polypeptide is conferred in smooth muscle tissue of the animal.

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